

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
US Department of Commerce
United States Patent and Trademark
Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing:

15 March 2001 (15.03.01)

International application No.:

PCT/GB00/03464

Applicant's or agent's file reference:

Heras 13/PCT

International filing date:

08 September 2000 (08.09.00)

Priority date:

09 September 1999 (09.09.99)

Applicant:

TIPPLE, Roger

1. The designated Office is hereby notified of its election made:



in the demand filed with the International preliminary Examining Authority on:

02 February 2001 (02.02.01)



in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer:

J. Zahra

Telephone No.: (41-22) 338.83.38

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(19) World Intellectual Property Organization
International Bureau



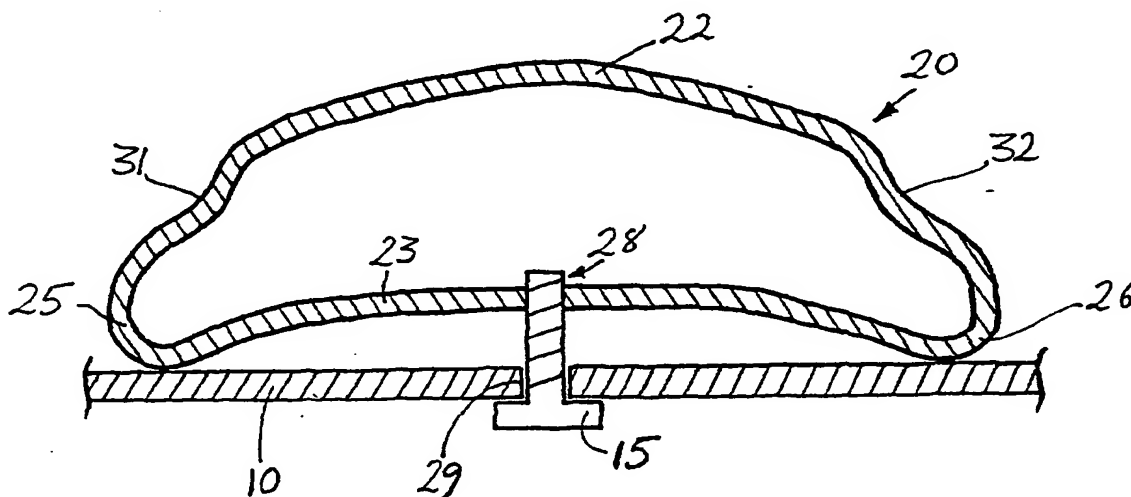
(43) International Publication Date
15 March 2001 (15.03.2001)

PCT

(10) International Publication Number
WO 01/18330 A1

- (51) International Patent Classification⁷: **E04H 17/14**
- (21) International Application Number: **PCT/GB00/03464**
- (22) International Filing Date:
8 September 2000 (08.09.2000)
- (25) Filing Language: **English**
- (26) Publication Language: **English**
- (30) Priority Data:
9921204.5 9 September 1999 (09.09.1999) **GB**
- (71) Applicant (for all designated States except US): **CRH FENCING LIMITED** [GB/GB]; Carr Hill, Doncaster DN4 8DQ (GB).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): **TIPPLE, Roger** [GB/GB]; 45 Abbot's Green, Low Willington, County Durham DL15 0QZ (GB).
- (74) Agent: **HARMAN, Michael, Godfrey**; Hillgate Patent Services, 6 Aztec Row, Berners Road, Islington, London N1 0PW (GB).
- (81) Designated States (national): **AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW.**
- (84) Designated States (regional): **European patent** (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).
- Published:**
— With international search report.
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: **FENCING SYSTEM**



(57) Abstract: A fencing system which includes a plurality of pales (20), one or more substantially horizontal rails (10), the rails including a substantially flat surface against which the pales are set, and the pales including a tubular cross section comprising a tubular wall a part of which is provided with holes (28) through which a bolt (15) or the like is passed to secure the pales. The cross section of the pale has a shape which is elongate in the direction of the rail. Further, the section includes a generally convex surface facing away from the rail. The section also includes a generally concave or re-entrant surface, so that the fastening means may engage with this surface and be concealed by this surface when the pale is regarded from side of the pale opposite to the concave surface.

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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference Heras 13/PCT	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/GB 00/ 03464	International filing date (day/month/year) 08/09/2000	(Earliest) Priority Date (day/month/year) 09/09/1999
Applicant CRH FENCING LIMITED		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☐ the text is approved as submitted by the applicant.

☒ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

1
☐ None of the figures.

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22122 INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 00/03464

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 E04H17/14

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 E04H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FR 2 309 118 A (NOVOPLAST GMBH) 19 November 1976 (1976-11-19)	1,2,7-13
Y	the whole document	3
Y	CH 482 087 A (NOVOPLAST) 30 November 1969 (1969-11-30)	3
X	DE 16 84 883 A (RAETZ) 13 November 1969 (1969-11-13)	1,2,7-13
A	the whole document	3
X	DE 296 11 017 U (KREUSEL MATTHIAS) 19 September 1996 (1996-09-19)	1,2,7-13
	the whole document	

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *Z* document member of the same patent family

Date of the actual completion of the international search

23 November 2000

Date of mailing of the international search report

01/12/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040. Tx. 31 651 epo nl.
Fax: (+31-70) 340-3016

Authorized officer

Vrugt, S

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 00/03464

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
FR 2309118	A	19-11-1976	CH 593446 A DE 7612449 U	30-11-1977 30-09-1976
CH 482087	A	30-11-1969	NONE	
DE 1684883	A	13-11-1969	NONE	
DE 29611017	U	19-09-1996	NONE	

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/GB 00/ 03464

Box III TEXT OF THE ABSTRACT (Continuation of item 5 of the first sheet)

- line 1, add "(20)" after "a plurality of pales".
- line 2, add "(10)" after "substantially horizontal rails".
- line 4, add "(28)" after "is provided with holes".
- line 5, add "(15)" after "a bolt".

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INVESTOR IN PEOPLE

Application No: GB 9921204.5
Claims searched: 1 - 12

Examiner: J D Cantrell
Date of search: 28 November 2000

Patents Act 1977 Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.R): E1D: DLCKM, DLCKN, DLEKMN, DLEKMNW, DLEKNSV,
DLEKMSW, DF109, DLEKN

Int Cl (Ed.7): E04H

Other: ON - LINE : WPI, EPODOC, PAJ

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	GB 2241721 A MURPHY	-
A	WO 96/11318 A1 B H P	-

X Document indicating lack of novelty or inventive step
Y Document indicating lack of inventive step if combined with one or more other documents of same category.

& Member of the same patent family

A Document indicating technological background and/or state of the art.
P Document published on or after the declared priority date but before the filing date of this invention.
E Patent document published on or after, but with priority date earlier than, the filing date of this application.

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PATENT COOPERATION TREATY

PCT

REC'D 08 NOV 2001

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)


Applicant's or agent's file reference ./.	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB00/03464	International filing date (day/month/year) 08/09/2000	Priority date (day/month/year) 09/09/1999
International Patent Classification (IPC) or national classification and IPC E04H17/14		
Applicant CRH FENCING LIMITED et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 6 sheets, including this cover sheet.
 - ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 4 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 02/02/2001	Date of completion of this report 06.11.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Leher, V Telephone No. +49 89 2399 7352



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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/03464

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1,4-7	as published			
2,3	as received on	15/10/2001	with letter of	11/10/2001

Claims, No.:

1-10	as received on	15/10/2001	with letter of	11/10/2001
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Drawings, sheets:

1/1	as published
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2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/03464

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

5. ☒ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

see separate sheet

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	8
	No:	Claims	1-7,9,10
Inventive step (IS)	Yes:	Claims	8
	No:	Claims	1-7,9,10
Industrial applicability (IA)	Yes:	Claims	1-10
	No:	Claims	

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

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**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB00/03464

Re Item I

Basis of the report

The amendments filed with the letter dated 11. Oct. 2001 introduce subject-matter which extends beyond the content of the application as filed, contrary to Article 34(2)(b) PCT. The **unallowabl** amendments concerned are the following:

Claim 1: Omission of the feature "*...the tubular wall is provided with holes through which a bolt or the like may pass to secure the pales.*"

Claim 2: Addition of the feature "*... press **resiliently**...*"

Claim 4, 5: Generalisation "*... the fastening means engage...*"

Claim 6: Addition of features by using the term "*further*"

Claim 8: Addition of the feature "*the **indentations induce buckling**...*"

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Independent claim 1, Lack of Novelty

1.1 Document DE-U-29611017, which is considered to represent the most relevant state of the art, discloses (cf. fig.4) a fencing system (s. p. 5, l. 16-20)

including

a plurality of pales 2, at least one horizontal rail 7, and fastening means 6 *like a bolt*, each pale including a tubular wall *a part of which is provided with holes (at the upper and the lower rail) through which the bolt 6 may pass to secure the pales*, whereby the tubular wall defines a re-entrant external surface 5a,5b,8 facing the rail (s. fig. 9, p. 11, l. 12-16) the fastening means 6 engaging the said surface so as to fasten the pale 2 to the rail 7 (s. p. 11, l. 16-25).

1.2 Thus, the combination of features of independent claim 1 is disclosed by the device described in document DE-U-29611017. Therefore, the subject-matter of claim 1 is not new.

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**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB00/03464

2. Independent claims 9 and 10, Lack of Novelty

2.1 The subject-matter of claim 9 respectively claim 10 is already disclosed in the document DE-U-29611017, which is considered to represent the most relevant state of the art.

2.2 Thus, the combination of features of independent claim 9 respectively claim 10 is disclosed in document DE-U-29611017. Therefore, the subject-matter of claim 9 respectively claim 10 is not new.

3. Dependent claims 2-8

3.1 Dependent claims 2 to 7 do not appear to contain any additional features which, in combination with the features of any claim to which they refer, are either new or involve an inventive step with respect to the prior art named in the present proceedings.

The reasons therefor are that the additional features of the said claims are

- either directly known from document DE-U-29611017,
- or are a combination of features obvious to the man skilled in the art in consideration of the disclosure of the prior art named in the present proceedings, or they concern only minor modifications which lie within the normal practice of the man skilled in the art.

3.2 The combination of features of claim 8 is neither known from nor rendered obvious by the available prior art.

Re Item VII

Certain defects in the international application

1. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document DE-U-29611017 is not mentioned in the description, nor is this document identified therein.

2. The description is not in conformity with the claims as required by Rule 5.1(a)(iii) PCT.

3. The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

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**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB00/03464

Re Item VIII

Certain observations on the international application

In the present application, the broadest claim is claim 10 which is a long way down so that it could be easily overlooked. The requirement that the claims must be clear (article 6 PCT) relating not only to claims individually but to the arrangement of the claims as a whole is not met. The Applicant should have re-arranged the claims in a more logical way, according to their scopes, the first claim being the broadest.

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CLAIMS

- 5 1. A fencing system including a plurality of pales, one or more substantially horizontal rails, the rails including a substantially flat surface against which the pales are set, wherein the pales include a tubular cross section comprising a tubular wall a part of which is provided with holes through which a bolt or the like may pass to secure the pales.
- 10 2. A fencing system according to claim 1, wherein the cross section of the pale has a shape which is elongate in the direction of the rail.
- 15 3. A fencing system according to either previous claim wherein the section of the pale includes a generally convex surface facing away from the rail.
- 20 4. A fencing system according to any previous claim wherein the section includes a generally concave or re-entrant surface, the fastening means engaging with this surface and being concealed by this surface when the pale is regarded from side of the pale opposite to the concave surface.
- 25 5. A fencing system according to Claim 4 wherein the concave surface of the pale and surface of the rail (or an intermediate member situated between the rail and the pale) which it faces are, at least before fastening, of different shapes so that a portion of the concave surface is not directly in contact with the rail, and the fastening means pull upon this portion of the concave surface of the pale such that it becomes prestressed.

*Explained by
Article 34*

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6. A fencing system according to any of claims 4-6 wherein the generally concave surface includes a flat central portion.
7. A fencing system according to either previous claim wherein the
5 holes are provided in a thickened part of the tubular wall part and include a female thread.
8. A method of erecting a fencing system comprising supporting a rail horizontally in its intended final position, and fastening a plurality of pales
10 according to any previous claim to said rail.
9. A fencing system substantially as herein described and illustrated.
10. A pale as defined in any previous claim.
- 15 11. A pale substantially as herein described and illustrated.
12. A method of erecting a fencing system substantially as herein described and illustrated.
- 20 13. Any novel and inventive feature or combination of features specifically disclosed herein within the meaning of Article 4H of the International Convention (Paris Convention).

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GB 2 241 721 (Murphy et al) discloses a method of joining the pales to the horizontal rails without using bolts, rivets or the like. The pale, having a cross section of a flattened trefoil shape, also features a lip along each vertical edge. A clamping plate engages with these lips, and this is then bolted or riveted to the horizontal rail. In this manner the fastening means is concealed from someone on the outside of the boundary. Similarly to a conventional pale, this pale is cold rolled.

Like a conventional pale, the pale disclosed in Murphy has poor strength perpendicular to its axis. Also the lips may deform if the pale is pulled upon, so allowing the pale to be detached from the horizontal rails.

The object of the present invention is to provide a system of fencing which is both structurally strong, and conceals its means of attaching the component parts when regarded from one side of the fencing.

According to the invention there is provided a fencing system including a plurality of pales, one or more substantially horizontal rails, the rails including a substantially flat surface against which the pales are set, wherein the pales include a tubular cross section comprising a tubular wall a part of which is provided with holes through which a bolt or the like may pass to secure the pales.

Preferably the cross section of the pale has a shape which is elongate in the direction of the rail

Each pale may have a substantially hollow section which includes a generally concave surface, the securement means engaging with this surface

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and being concealed by this surface when the pale is regarded from side of the pale opposite to the concave surface.

5 Preferably the concave surface of the pale and surface of the rail (or an intermediate member situated between the rail and the pale) which it faces are, at least before securement, of different shapes so that a portion of the concave surface is not directly in contact with the rail, and the securement means pull upon this portion of the concave surface of the pale such that it becomes prestressed

10

Preferably the securement means include a bolt passing through both the rail and the concave surface. Preferably the generally concave surface includes a flat central portion. The pale is preferably formed cold rolling or welded round tube into the desired cross section. The pale can formed
15 directly from strip by forming the strip into a tube and then welding it and then forming the tube into desired cross section. Alternatively the pale can be cold formed from pre-made tube. The pale may also be conveniently made by extrusion.

20 According to another aspect of the present invention, there is provided a pale as herein defined.

The pale, when viewed in cross section, has a rear wall comprising a curved surface which is arranged against the horizontal rails and attached
25 thereto, this rear wall forming part of the hollow section. When the fence is approached from the front, the concavity of the rear wall will shield the securement means.

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Fencing System

The present invention relates to a fencing system, in particular, but not exclusively, to palisade fencing.

5

In a known type of palisade fencing, vertical pales are attached to a number of horizontal rails. These in turn are attached to vertical posts, which are set in the ground. The pales are usually bolted or riveted to the horizontal rails.

10

A pale is conventionally a strip of material such as metal of generally curved cross section, and is mounted upon the horizontal rails by its concave surface, so as to present its convex surface. When using such a palisade for an enclosed boundary, these convex surfaces are usually facing outwards. A known pale has a cross section of a flattened trefoil shape. Such a pale is usually formed by cold rolling a strip of metal.

15

Holes through the thickness of the pale are formed, each hole corresponding to a hole in the horizontal rail to which the pale is to be attached. A bolt is then used to fasten the pale and the horizontal rail, the head of the bolt being upon the convex surface of the pale. Similar attachment means such as rivets or the like, may be substituted.

20

This bolt head is very apparent, and offers an enticing target for vandals. Should the bolt head be removed, by being sheared off with a cold chisel for example, the pales may be removed and access gained to the area enclosed by the palisade. Also, while a pale with a generally curved cross section has good structural strength axially, it has poor strength perpendicular to the axis.

25

GB 2 241 721 (Murphy et al) discloses a method of joining the pales to the horizontal rails without using bolts, rivets or the like. The pale, having a cross section of a flattened trefoil shape, also features a lip along each vertical edge. A clamping plate engages with these lips, and this is then bolted or riveted to the horizontal rail. In this manner the fastening means is concealed from someone on the outside of the boundary. Similarly to a conventional pale, this pale is cold rolled.

Like a conventional pale, the pale disclosed in Murphy has poor strength perpendicular to its axis. Also the lips may deform if the pale is pulled upon, so allowing the pale to be detached from the horizontal rails.

The object of the present invention is to provide a system of fencing which is both structurally strong, and conceals its means of attaching the component parts when regarded from one side of the fencing.

According to the invention there is provided a fencing system including a plurality of pales, one or more substantially horizontal rails, the rails including a substantially flat surface against which the pales are set, wherein the pales include a tubular cross section comprising a tubular wall a part of which is provided with holes through which a bolt or the like may pass to secure the pales.

Preferably the cross section of the pale has a shape which is elongate in the direction of the rail

Each pale may have a substantially hollow section which includes a generally concave surface, the securement means engaging with this surface

and being concealed by this surface when the pale is regarded from side of the pale opposite to the concave surface.

5 Preferably the concave surface of the pale and surface of the rail (or an intermediate member situated between the rail and the pale) which it faces are, at least before securement, of different shapes so that a portion of the concave surface is not directly in contact with the rail, and the securement means pull upon this portion of the concave surface of the pale such that it becomes prestressed

10

Preferably the securement means include a bolt passing through both the rail and the concave surface. Preferably the generally concave surface includes a flat central portion. The pale is preferably formed cold rolling or welded round tube into the desired cross section. The pale can formed
15 directly from strip by forming the strip into a tube and then welding it and then forming the tube into desired cross section. Alternatively the pale can be cold formed from pre-made tube. The pale may also be conveniently made by extrusion.

20 According to another aspect of the present invention, there is provided a pale as herein defined.

The pale, when viewed in cross section, has a rear wall comprising a curved surface which is arranged against the horizontal rails and attached
25 thereto, this rear wall forming part of the hollow section. When the fence is approached from the front, the concavity of the rear wall will shield the securement means.

Furthermore, a securement means, such as a bolt, common to both the rail and the pale and which tends to pull the curved surface of the pale towards the rail, will tend to flatten the concavity and prestress the pale, making the pale more rigid against the rail and making it very difficult to gain access to the securement means through the regions where the rail and pale abut.

A fencing system embodying the invention will now be described, by way of example, with reference to the drawings, of which;

10

Figure 1 shows a sectional view of the pale and the horizontal rail at the attachment point.

Referring to Figure 1, the pale 20 has a generally crescent shaped hollow cross section, including a curved front wall 22, and a curved back wall 23. Rather than cusps, the regions 25,26 where the front and back walls meet are rounded. The pale then has a concave surface (the back wall 23), and a convex surface (the front wall 22).

20 The back wall 23 is placed against the rail 10, so that the rounded portions 25,26 rest directly against the rail. Each pale has a hole 28 centrally located in the concave surface, and the rail has corresponding holes 29 along its length. To secure the pale to the rail, the two holes 28,29 are aligned and a bolt 15 introduced to them. The generally concave surface of the back wall is substantially flat at the central region where the hole occurs. This makes it easier to form the hole 28 in the pale, and easier to introduce the bolt to the hole 28.

The hole 28 in the pale is such a size that the thread of the bolt 15 engages with it, whilst the hole 29 of the rail is somewhat larger, the bolt being constrained against the rail by its head. The hole 28 is a threaded hole and in order to provide sufficient engagement with the thread of the bolt, the corresponding female thread will have to extend to a greater extent than the thickness of the wall of the pale. This additional female thread can be provided by thickening of the wall at that point, or by providing a separate nut means to the pale at the hole. Conveniently this may be provided by a threaded pot rivet which is introduced into the hole when the pale is connected to the rail from the rail side and expands to form a threaded part on the pale side of the hole 28. Alternatively a flow drilling may be used which creates an extended threaded portion from the existing hole which could be achieved by means of a self tapping bolt means.

As the bolt is tightened, the back wall 23 is drawn by the bolt's thread towards the rail 10. The crescent shape of the pale is drawn somewhat flatter as the pale is stressed.

When the pale is attached to the rail in this prestressed state, the securing bolt 15 is covered by the overhanging portions of the pale 20 when considered facing the front convex wall of the pale. In order to remove the pale from this side of the fencing, an intruder would have to force a tool or lever between one of the rounded portions 25,26 and the rail. This is difficult, since a large force is needed to overcome the prestressing of the pale.

When conventional pales are removed, the intruder will sometimes conceal that fact by resting the removed pales loosely against the pale, or temporarily fixing the pales, with chewing gum for example. To a casual

observer, the pales look undamaged, but the intruder may conveniently remove the pales to gain access to the fenced off region on subsequent occasions.

5 The pale illustrated in figure 1 includes indentations 31,32 which run the length of the pale. When a large predetermined force is applied between pale and the rail, the pale collapses and buckles. This occurs before the bolt fails. This buckling makes it obvious from a distance that the pale has been tampered with and needs replacing. Means for testing for
10 failed bolts or rivets have been devised such as passing along the fence with a stick rapping against the pales and detecting the change in the sound which would indicate a faulty bolt or rivet. Such labour intensive testing methods are no longer required with the fencing system of this invention.

15 The particular shape of the cross section of the pale and in particular the indentations 32 are important in determining the mode of failure of the pale which determines nature of the collapse and makes it possible for the pale to be observed as having failed.

20 The hollow section of the pale provides great strength and rigidity perpendicular to the pale's axis, whilst losing none of the axial strength.

The horizontal rails may then be attached to vertical posts embedded in the ground in the conventional manner.

25

The pale is formed by forming a strip first into a round tubular cross section and welding it and subsequently forming the welded tube into the desired cross section if required, though other methods could be employed. For example, the pale may be is formed by rolling a shape having a similar

cross section but with an open shape instead of the hollow section, and then bent and welding the shape to form the tubular section.

5 The pale may also be formed by extruding metal through an aperture of the required shape to produce the required cross section. Other materials, such as composite materials, could equally well be used.

10 At the top of the pale, the front wall could be axially subdivided and the resulting strips flared out to form an upper projection, known as a topping, in a similar way to conventional pales. Alternatively, the hollow section could be left open, and a topping fitted into the open top of the pale.

The horizontal rail 10 illustrated here is a standard strip, though rails having other cross sections could be used with equal facility.

15

Equally, the rail illustrated has a uniform, flat surface facing the concave surface of the pale. The rail surface could though take a variety of shapes. It could be a convex surface with a curvature less than that of the concave surface of the pale. It could also be a convex shape corresponding to the concavity of the pale, and although no prestressing will occur, the bolt will be concealed by the pale.

25 The concealing portion of the pale need not be smoothly curved, but may be a re-entrant shape composed of flat surfaces and sharp angles, even to the extent of being rectangular. Naturally, the pale need not abut directly against the rail, but an intermediate member could be inserted between the rail and the pale.

CLAIMS

- 5 1. A fencing system including a plurality of pales, one or more substantially horizontal rails, the rails including a substantially flat surface against which the pales are set, wherein the pales include a tubular cross section comprising a tubular wall a part of which is provided with holes through which a bolt or the like may pass to secure the pales.
- 10 2. A fencing system according to claim 1, wherein the cross section of the pale has a shape which is elongate in the direction of the rail.
3. A fencing system according to either previous claim wherein the
15 section of the pale includes a generally convex surface facing away from the rail.
4. A fencing system according to any previous claim wherein the
20 section includes a generally concave or re-entrant surface, the fastening means engaging with this surface and being concealed by this surface when the pale is regarded from side of the pale opposite to the concave surface.
5. A fencing system according to Claim 4 wherein the concave surface
25 of the pale and surface of the rail (or an intermediate member situated between the rail and the pale) which it faces are, at least before fastening, of different shapes so that a portion of the concave surface is not directly in contact with the rail, and the fastening means pull upon this portion of the concave surface of the pale such that it becomes prestressed.

6. A fencing system according to any of claims 4-6 wherein the generally concave surface includes a flat central portion.
7. A fencing system according to either previous claim wherein the
5 holes are provided in a thickened part of the tubular wall part and include a female thread.
8. A method of erecting a fencing system comprising supporting a rail horizontally in its intended final position, and fastening a plurality of pales
10 according to any previous claim to said rail.
9. A fencing system substantially as herein described and illustrated.
10. A pale as defined in any previous claim.
15
11. A pale substantially as herein described and illustrated.
12. A method of erecting a fencing system substantially as herein described and illustrated.
20
13. Any novel and inventive feature or combination of features specifically disclosed herein within the meaning of Article 4H of the International Convention (Paris Convention).

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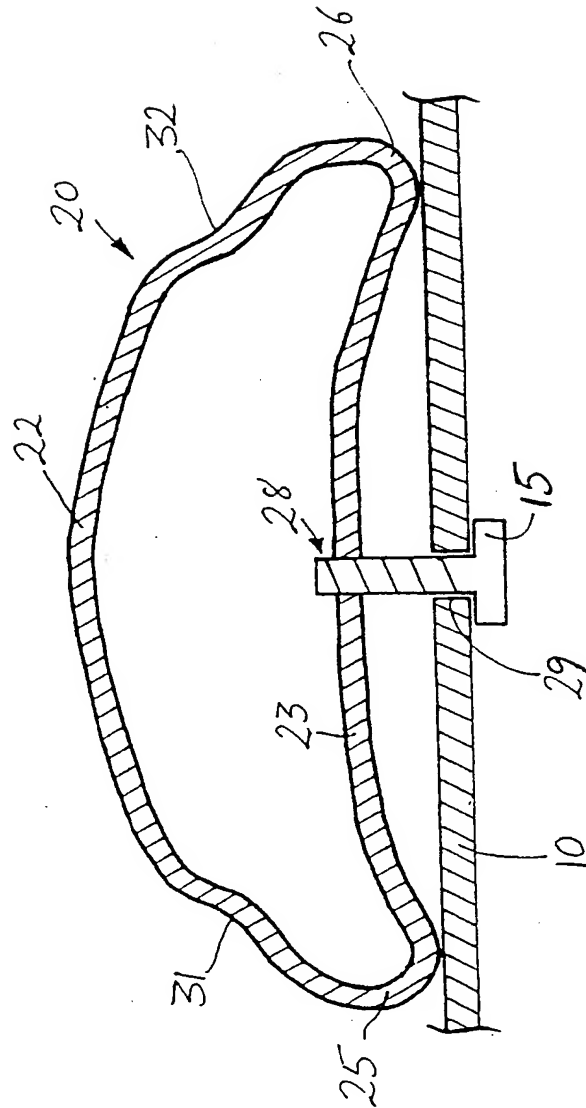


FIG. 1

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AMENDED CLAIMS

1. A fencing system including a plurality of pales, at least one horizontal rail, and fastening means;

5

each pale including a tubular wall;

and characterised in that the tubular wall defines a generally concave or re-entrant external surface facing the rail,

10

the fastening means engaging the said surface so as to fasten the pale to the rail.

2. A fencing system according to claim 1, characterised in that the concave or re-entrant surface defines a space between the pale and the rail, and the fastening means pass through the space,

15

such that the fastening means draw the concave or re-entrant surface towards the rail so as to press the wall resiliently against the rail.

20 3. A fencing system according to either of claims 1 or 2, characterised in that the pale includes a generally convex outer surface facing away from the rail.

4. A fencing system according to any preceding claim, characterised in that the concave or re-entrant surface includes a flat central portion, and the fastening means engage therewith.

25

5. A fencing system according to any preceding claim, characterised in that the concave or re-entrant surface includes a thickened portion, and the fastening means engage therewith.

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6. A fencing system according to any preceding claim, characterised in that the concave or re-entrant surface further includes a threaded hole, and the fastening means comprise a bolt or the like which engages in the threaded hole.

5

7. A fencing system according to any of claims 3-6, characterised in that the pale has a generally crescent shaped hollow cross section, the cross section including rounded regions where the concave or re-entrant surface meets the convex surface, the rounded regions abutting the rail.

10

8. A fencing system according to any preceding claim, characterised in that the pale includes longitudinal indentations, the indentations inducing buckling of the pale when the pale is subjected to a predetermined force, the force being less than that required to break the fastening means and so detach the pale from the rail.

15

9. A method of erecting a fencing system as defined in any preceding claim, comprising fixing the rail horizontally in its intended final position, and fastening the pales to the rail.

20 10. A pale as defined in any of claims 1-8.

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FR-A-2309118 shows a fence with hollow pales attached to rails by bolts, screws or the like.

5 GB 2 241 721 (Murphy et al) discloses a method of joining the pales to the horizontal rails without using bolts, rivets or the like. The pale, having a cross section of a flattened trefoil shape, also features a lip along each vertical edge. A clamping plate engages with these lips, and this is then bolted or riveted to the horizontal rail. In this manner the fastening means is concealed from someone on the outside of the boundary. Similarly to a conventional pale, this pale is cold
10 rolled.

Like a conventional pale, the pale disclosed in Murphy has poor strength perpendicular to its axis. Also the lips may deform if the pale is pulled upon, so allowing the pale to be detached from the horizontal rails.

15

The object of the present invention is to provide a system of fencing which is both structurally strong, and conceals its means of attaching the component parts when regarded from one side of the fencing.

20 According to the present invention there is provided a fencing system including a plurality of pales, at least one horizontal rail, and fastening means; each pale including a tubular wall; and characterised in that the tubular wall defines a generally concave or re-entrant external surface facing the rail, the fastening means engaging the said surface so as to fasten the pale to the rail.

25

According to a further aspect of the invention there is provided a method of erecting a fencing system as defined herein, comprising fixing the rail horizontally in its intended final position, and fastening the pales to the rail.

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According to a yet further aspect of the invention there is provided a pale as defined herein.

5 The rail may include a substantially flat surface against which the pales are set, wherein the pales include a tubular cross section comprising a tubular wall a part of which is provided with holes through which a bolt or the like may pass to secure the pales. Each pale may have a substantially hollow section which includes a generally concave surface, the securement means engaging with this surface and being concealed by this surface when the pale is regarded from the
10 side of the pale opposite to the concave surface.

Preferably the concave surface of the pale and surface of the rail (or an intermediate member situated between the rail and the pale) which it faces are, at least before securement, of different shapes so that a portion of the concave
15 surface is not directly in contact with the rail, and the securement means pull upon this portion of the concave surface of the pale such that it becomes prestressed,

Preferably the securement means include a bolt passing through both the rail and the concave surface. Preferably the generally concave surface includes a
20 flat central portion. The pale is preferably formed by cold rolling or welding round tube into the desired cross section. The pale can be formed directly from strip by forming the strip into a tube and then welding it and then forming the tube into the desired cross section. Alternatively the pale can be cold formed from pre-made tube. The pale may also be conveniently made by extrusion.

25 The pale, when viewed in cross section, has a rear wall comprising a curved surface which is arranged against the horizontal rails and attached thereto, this rear wall forming part of the hollow section. When the fence is approached from the front, the concavity of the rear wall will shield the securement means.

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The object of the present invention is to provide a system of fencing which is both structurally strong, and conceals its means of attaching the component parts when regarded from one side of the fencing.

According to the present invention there is provided a fencing system including a plurality of pales, at least one horizontal rail, and fastening means; each pale including a tubular wall; and characterised in that the tubular wall defines a generally concave or re-entrant external surface facing the rail, the fastening means engaging the said surface so as to fasten the pale to the rail.

According to a further aspect of the invention there is provided a method of erecting a fencing system as defined herein, comprising fixing the rail horizontally in its intended final position, and fastening the pales to the rail.

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According to a yet further aspect of the invention there is provided a pale as defined herein.

The rail may include

~~According to the invention there is provided a fencing system including a plurality of pales, one or more substantially horizontal rails, the rails including~~ a substantially flat surface against which the pales are set, wherein the pales include a tubular cross section comprising a tubular wall a part of which is provided with holes through which a bolt or the like may pass to secure the pales.

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Each pale may have a substantially hollow section which includes a generally concave surface, the securement means engaging with this surface and being concealed by this surface when the pale is regarded from *the* side of the pale opposite to the concave surface.

Preferably the concave surface of the pale and surface of the rail (or an intermediate member situated between the rail and the pale) which it faces are, at least before securement, of different shapes so that a portion of the concave surface is not directly in contact with the rail, and the securement means pull upon this portion of the concave surface of the pale such that it becomes prestressed.

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from strip by forming the strip into a tube and then welding it and then forming the tube into *the* desired cross section. Alternatively the pale can be cold formed from pre-made tube. The pale may also be conveniently made by extrusion.

~~/According to another aspect of the present invention, there is provided a pale as herein defined./~~

The pale, when viewed in cross section, has a rear wall comprising a curved surface which is arranged against the horizontal rails and attached thereto, this rear wall forming part of the hollow section. When the fence is approached from the front, the concavity of the rear wall will shield the securement means.

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